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EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS
ON THE APALACHICOLA RANGER DISTRICT,
APALACHICOLA NATIONAL FOREST, FLORIDA

By

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INTRODUCTION

The Apalachicola District, Apalachicola National Forest is located in northwest Florida about 40 miles southwest of Tallahassee (Fig. 1). Periodic aerial detection surveys conducted over this area since the late 1950's have revealed no serious insect or disease problems. However, during November 1976 several spots of dying pines were observed from the air and after ground checking by the District were verified as southern pine beetle, *Dendroctonus frontalis* Zimm. infestations. This was the first reported occurrence of the beetle on the Apalachicola Ranger District. Since the initial discovery of the infestations the area has been examined by the Aerial Survey Team, Insect and Disease Management Unit, several times from the air and on the ground.

The purpose of this report is to give an evaluation of the southern pine beetle outbreak on the Apalachicola Ranger District based on the data obtained from the aerial and ground surveys.

METHODS

A 100% aerial sketchmap survey was conducted on 20,000 acres of the Apalachicola National Forest during January 1977. The purpose of the survey was to determine the current status of southern pine beetle infestations detected on a reconnaissance survey made in November 1976.

Standard aerial sketchmap procedures were followed.^{1/}
In addition aerial photographic coverage was made of approximately 70% of the survey area during February 1977.

Five spots of red-topped pines were examined on the ground to determine the amount of beetle activity in the infested area. Measurements of stand characteristics such as basal area, tree height, and diameter were made in the infestations to determine stocking and the volume of timber affected.

TECHNICAL INFORMATION

Insect - The southern pine beetle, *Dendroctonus frontalis* Zimm. is a dark reddish brown to black beetle about 2.2 to 4.2 mm. long. Eggs are oval, pearly white in color and about 1.5 mm. long and 1 mm. wide. Larvae are white, legless, grublike worms about 2 to 5 mm. long. They have reddish head capsules and curved bodies.

Host - Southern pine beetle is a native forest pest that will attack all species of southern yellow pine. The species of pine most susceptible to attack in the area include loblolly (*Pinus taeda* L.) and shortleaf (*P. echinata* Mill.). Occasionally longleaf (*P. palustris*) and slash pine (*P. ellottii*) will be attacked.

Type of Damage - This insect causes death of a tree by mining in the cambium as it constructs eggs galleries. The beetle also introduces blue stain fungi, *Ceratocystis* spp. which slows down or blocks water conduction in the stem. Individual infestations may range in size from a single tree to several thousand trees.

Life Cycle of the Beetle - Adult beetles may attack trees in mass at any time of the year in the Apalachicola area. The adult bores into the tree and constructs winding S-shaped egg galleries in the cambium. Eggs deposited in niches along the galleries hatch into grubs that feed in the cambium. When fully developed, the larvae mine to the outer bark where they pupate and transform to adults. The newly emerged adults chew their way to the outside, fly to and attack green trees.

^{1/} Detection of Forest Pests in the Southeast, 1976. U.S.D.A., U.S.F.S., SA, S&PF, Div. of FPM, Pub. S&PF-7, Atlanta, Ga. 51 pp.

The complete life cycle takes about 30 days during the summer and as many as seven generations may be produced annually in the Apalachicola area.

RESULTS AND DISCUSSION

Results of this evaluation showed a rapidly expanding southern pine beetle population on the Apalachicola Ranger District. Twelve infestations containing an estimated 3000 red and fading trees were detected on the aerial surveys (Table 1). Infestations were concentrated in a 16,000-acre area on the west end of the District, where most of the loblolly pine type is located (Fig. 1).

Ground checking of five spots revealed that southern pine beetle was the primary causal agent and that the spots were actively infested at the time of the ground survey. Individual trees examined in the infestations showed healthy brood and no evidence of cold weather mortality. Temperatures dropped to the teens in this area during the winter but apparently had little affect on the beetle brood. Beetles continued to emerge and attack green trees throughout the winter months.

Stand factors may be contributing to the beetle problem on the Apalachicola District. Although this is an excellent site for loblolly pine, the area is subject to periodic flooding which may cause considerable stress on the tree. The high water mark visible on trees in three of the infestations was about four feet. In addition many of the stands are overstocked and overmature. Basal area of pine in the five spots ground-checked averaged 190 square feet per acre. Research has shown that overstocked stands are highly susceptible to southern pine beetle attack and that infestations occurring in these stands are more likely to increase in size than infestations occurring in stands with low basal areas (Coulson, et. al. 1974, Ku, et. al. 1976, Lorio, 1968, Hedden, 1976).

In conclusion the potential for a severe outbreak on the Apalachicola District is high. Several additional infestations have been discovered by the District personnel since the ground evaluation. With these additional spots the amount of timber affected on the District is considerably greater than indicated on the current survey.

Table 1. Summary of aerial and ground survey data, southern pine beetle evaluation, Apalachicola Ranger District, 1977.

	Ownership Unit
1. Results compiled from data collected during the aerial phase of the evaluation:	
Survey type	Aerial Sketchmap and Photographic
Date of aerial survey	Jan. 10 and Feb. 6, 1977
Percent survey.	100%
Total acreage surveyed.	20,000
Total acreage of Forest Service land.	18,000
Susceptible host type acreage of Forest Service land.	5,000
Total number of spots within the survey boundary.	12
Total number of spots on Forest Service lands	12
Spots per M acre of host type Forest Service lands.	2.4
Average spot size (trees) Forest Service lands.	77
Average spot size (trees) Forest Service lands.	2-400
Reds and faders/M acres host type on Forest Service lands	185
2. Results compiled from data collected during the ground and aerial phases of the evaluation:	
Date of ground phase.	2/28/77
Infested trees per M acre of host type Forest Service lands	190*
Total number of infested trees on Forest Service lands.	949
Total volume of infested trees on Forest Service lands.	148.5 MBF
Total number of affected trees on Forest Service lands.	2653
Total volume of affected trees on Forest Service lands.	415 MBF
Ratio of green infested to total red and fading trees	1 to 1.7

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd ft. per cord.

*No. of infested trees found on ground check less than occurring on date of aerial survey due to removal of two spots.

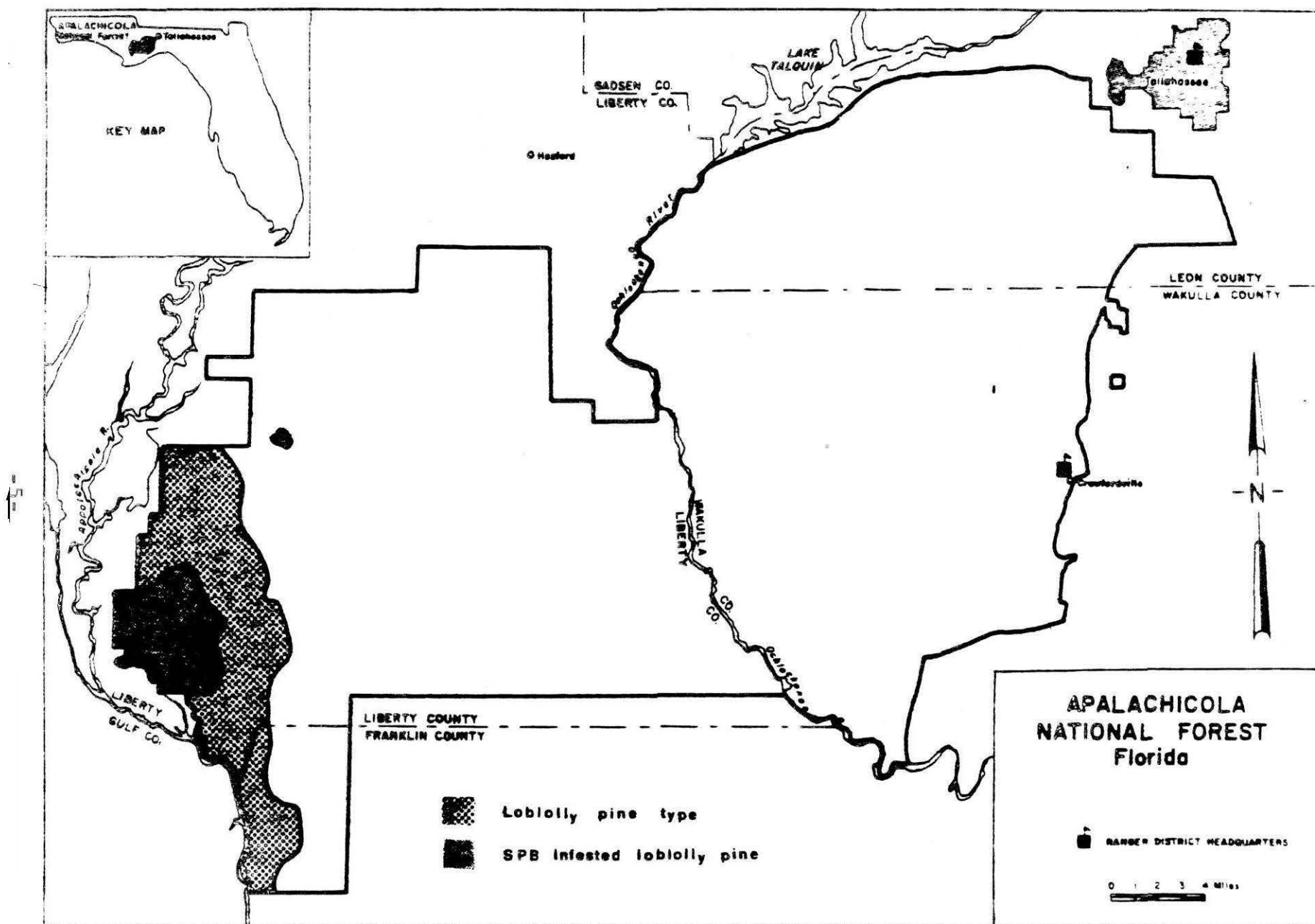


Figure 1. Location of southern pine beetle infestations on the Apalachicola Ranger District 1977.

RECOMMENDATIONS

The potential for increased timber mortality from southern pine beetle activity is great in the area and resource values appear high enough to warrant a suppression project. The District has already done a tremendous job of removing several infestations. Heavy rainfall has been a detriment in the removal of the infestations but loggers have made every effort to reach the affected areas. Since this is a newly infested area and the beetles are concentrated in only a few spots, control efforts should significantly reduce the severity of the outbreak.

Any control action taken should follow the procedures outlined as follows:

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

Where practical, and if host type is present, a 40- to 100-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. Normally the maximum buffer strip recommended is 70 feet. However in this area average tree height, which is the basis for determining the width of the buffer strip, often exceeds 90 feet. Therefore the maximum width of the buffer strip should be increased to approximately 100 feet. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, non-infested trees surrounding the spot may be marked to provide an operable cut.

The order of priority for removing beetle infested timber from a spot should be as follows:

Trees having nearly developed broods (usually the red and fading trees).

Trees having young broods (usually the green, recently infested trees).

Trees in the buffer zone.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be

thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the piling and burning operation.

3. Chemical Control. Chemical formulation recommended for southern pine beetle control is a 1/2 percent lindane spray with water or No. 2 fuel oil as the carrier. This should be mixed according to instructions indicated on the label by the manufacturer.

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Spray stumps and bark removed by woodpeckers. Low pressure sprayers may be used to treat large, accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetles have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in section 8.3 of the Forest Service Health and Safety Code and FSM 5242.21. Detailed safety procedures should be outlined in the project suppression plan.

4. Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated within two or three weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

REFERENCES

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ADDENDUM

RE-EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON APALACHICOLA RANGER DISTRICT, APALACHICOLA NATIONAL FOREST, FLORIDA

On May 3 and 4, 1977 Patrick J. Barry, entomologist from the Asheville Field Office, made an evaluation of southern pine beetle infestations on the Apalachicola Ranger District in Florida. The purpose of the evaluation was to determine if the status of the outbreak had changed since the February evaluation and to obtain current data for planning a control project.

Normally a second evaluation would not be necessary. However, in the Apalachicola area the climate is so favorable for beetle development that activity continues throughout the winter months. Since the initial survey the southern pine beetle population has completed two generations. There was a brief period of unusually cold weather during the winter but the initial evaluation showed that the cold weather had little effect on the population.

Results of this re-evaluation revealed that the southern pine beetle outbreak is continuing on the Apalachicola District. The beetle population appeared to be expanding as indicated by an increase in the number of spots since February (12 to 33) and an increase in the green to red tree ratio (See Table 1 of the addendum). The total number of infested trees decreased slightly but the volume of infested trees almost doubled because recent infestations occurred in larger volume trees.

In conclusion these findings indicate a high potential for increased beetle activity during the coming summer months. Therefore it is recommended that the District continue to control infestations through the procedures outlined in the evaluation report. Since November 1976 the District has done an excellent job of removing infestations through commercial sales. Approximately two million board feet of timber has been removed from infestations in the outbreak area.

Tab. 1. Summary of aerial and ground survey ta, southern pine beetle evaluation, Apalachicola Ranger District, May 1977.

1. Results compiled from data collected during the aerial phase of the evaluation:

Survey type	Aerial sketchmap
Date of aerial survey	5/3/77
Percent survey.	100%
Total acreage surveyed.	20,000
Total acreage of Forest Service land.	18,000
Susceptible host type acreage of Forest Service land.	5,000
Total number of spots within the survey boundary.	33
Total number of spots on Forest Service lands	33
Spots per M acre of host type Forest Service lands.	6.6
Average spot size (trees) Forest Service lands.	35
Range of spot sizes (trees) Forest Service lands.	2-400
Reds and faders/M acres host type on Forest Service lands . . .	231

2. Results compiled from data collected during the ground and aerial phases of the evaluation:

Date of ground phase.	5/4/77
Infested trees per M acre of host type Forest Service lands . .	166
Total number of infested trees on Forest Service lands.	829
Total volume of infested trees on Forest Service lands.	262,642 BF
Total number of affected trees on Forest Service lands.	2,242
Total volume of affected trees on Forest Service lands.	711,162 BF
Ratio of green infested to total red and fading trees	1.9 to 1

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd. ft. per cord.